

Remarks

The Final Office Action dated January 9, 2009 lists the following objection and rejections: claim 11 is objected to due to informalities; claims 15-18 stand rejected under 35 U.S.C. § 112(2); claim 15 stands rejected under 35 U.S.C. § 102(b) over Omura *et al.* (EP 1168455); claims 1, 4-7, 9-10 and 12-14 stand rejected under 35 U.S.C. § 103(a) over the ‘455 reference; claims 2 and 11 stand rejected under 35 U.S.C. § 103(a) over the ‘455 reference in view of Onda *et al.* (“SIC Integrated MOSFETs” Physica Status Solidi (A), Applied Research, Berlin, DE, vol.162, no. 1, 16 July 1997, pages 369-388); claim 3 stands rejected under 35 U.S.C. § 103(a) over the ‘455 reference in view of Miyano *et al.* (JP 403211885); claim 8 stands rejected under 35 U.S.C. § 103(a) over the ‘455 reference in view of Hshieh *et al.* (U.S. Patent Pub. 2001/0003367); and claims 16-18 stand rejected under 35 U.S.C. § 103(a) over the ‘455 reference. Applicant traverses the objections and rejections, and does not acquiesce to any rejection or averment in this Office Action unless Applicant expressly indicates otherwise.

Applicant has amended claim 11 as suggested by the Examiner. Therefore the objection to claim 11 should be removed.

Applicant respectfully traverses the § 102(b) and § 103(a) rejections because the cited combination of references lacks correspondence to the claimed invention. For example, none of the asserted references teach the claimed invention “as a whole” (§ 103(a)) including aspects regarding, *e.g.*, the thickness of the gate-field plate insulator being greater than or equal to the thickness of the field plate insulator. Because none of the cited reference teaches these aspects, no reasonable combination of these references can provide correspondence to the claimed invention. As such, the § 102(b) and § 103(a) rejections fail.

More specifically, the ‘455 reference fails to correspond to aspects of the claimed invention directed to the thickness of the gate-field plate insulator being greater than or equal to the thickness of the field plate insulator. In contrast, the ‘455 reference teaches that the insulator between buried electrode 17 and gate electrode 19 (second insulating film 18) has a thickness between 400 to 450Å, whereas the insulator (first insulating film 16) for buried electrode 17 has a thickness of 3000Å. *See, e.g.*, Figures 7-14A and

Paragraphs 0037-0041. Thus, the insulator between buried electrode 17 and gate electrode 19 is substantially thinner than the insulator for buried electrode 17.

In a failed attempt to address the deficiencies of the ‘455 reference, the Examiner erroneously asserts that the skilled artisan would modify the insulator thicknesses taught by the ‘455 reference via “routine experimentation and optimization to achieve the desired device performance.” Without further explanation, the record indicates that, at best, the Office Action’s § 103 rejection is based solely on “obvious to try” arguments. Such allegations ignore the teaching-away evidence and contradict one of the two situations, as explained in the recent Federal Circuit case, *In re Kubin*, in which the “obvious to try” standard may not be applied.

The cited ‘455 reference teaches away from the asserted combination by leading in a direction divergent from the path that was taken by Applicant. Consistent with the recent Supreme Court decision, M.P.E.P. § 2143.01 explains the long-standing principle that a §103 rejection cannot be maintained when the asserted modification undermines either the operation or the purpose of the main (‘455) reference - the rationale being that the prior art teaches away from such a modification. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1742 (2007) (“[W]hen the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious.”). The ‘455 reference teaches that the first insulating film 16 (*i.e.*, the asserted field plate insulator) is preferably thicker than the second insulating film 18 (*i.e.*, the asserted gate-field plate insulator), while the thickness of film 16 may be determined by a breakdown voltage and the thickness of film 18 may be determined by a threshold voltage. *See, e.g.*, paragraph 0031. The specific example thicknesses given by the ‘455 reference indicate that film 16 should be substantially thicker than film 18 (*e.g.*, 3000Å versus 450Å). As such, by expressly teaching that film 16 should be thicker than film 18, the ‘455 reference teaches away from the thickness of the gate-field plate insulator being greater than or equal to the thickness of the field plate insulator, as in the claimed invention.

Moreover, the Office Action provides no reason why the skilled artisan would be led along such a divergent path from that taught by the ‘455 reference involving the second insulating film 18 being thicker than the insulator for buried electrode 17.

Without further explanation, the record indicates that, at best, the Office Action's § 103(a) rejection is based solely on "obvious to try" arguments. Such a rejection, however, has been reviewed and assessed adversely by the *In re Kubin* court which explains that the "obvious to try" standard may not be applied where one would have "to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful." *In re Kubin* (Fed. Cir. April 3, 2009), interpreting KSR. See also M.P.E.P. § 2143(E), and *Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 725 (Fed. Cir. 1990) ("we have consistently held that 'obvious to try' is not to be equated with obviousness.").

In view of the above, the § 102(b) and § 103 rejections are improper and Applicant requests that they be withdrawn.

Applicant further traverses the rejections because the cited portions of '455 reference do not correspond to aspects of the claimed invention directed to the drift region having a steeply graded doping concentration, with the concentration increasing from the body region to the drain region (e.g., the concentration is at least 50 times greater adjacent to the drain region than adjacent to the body region). Applicant's disclosure teaches benefits associated with having a steeply graded concentration gradient. *See, e.g.*, Paragraphs 0021-0022. However, the cited portions of the '455 reference provide no appreciation of or recognition for such benefits, and thus any proposed modification would appear to be improperly based upon Applicant's disclosure. *See, e.g.*, M.P.E.P. § 2142. More specifically, the cited portions of the '455 reference simply teach that the impurity concentration of drift layer 12 increases toward the substrate 11. *See, e.g.*, Figure 2 and Paragraph 0053. The cited portions of the '455 reference do not provide any indication regarding the actual level of impurity concentration in drift layer 12 near well layer 13 relative to the actual level of impurity concentration in drift layer 12 near substrate 11, let alone teach that the doping concentration in the drift region has a steeply graded concentration gradient as in the claimed invention. Accordingly, the rejections are improper and Applicant requests that they be withdrawn.

Applicant further traverses the § 103(a) rejection of claim 3 because the cited combination does not correspond to the claimed invention “as a whole” (§ 103(a)) including aspects directed to the gate electrode having side pieces adjacent to the sidewalls of the insulated trench and a top piece that is between the side pieces, with the gate being located in an insulated trench above the field plate electrode (*see e.g.*, gate 32 shown in Applicant’s Figure 4). Instead, the ‘855 reference teaches a single gate electrode 3 in an insulated trench, with the gate electrode being in close proximity to the drain region 11. *See, e.g.*, the Abstract. In contrast, the ‘455 reference teaches a trench containing two electrodes, with buried electrode 17 being located in trench 15 between gate electrode 19 and substrate 11 (*i.e.*, the asserted drain region). *See, e.g.*, Figure 2. Thus, the ‘855 and ‘455 references teach devices with substantially different configurations. The Office Action, however, has not provided any evidence that replacing the ‘455 reference’s gate electrode 19 with the ‘855 reference’s gate electrode 3 would reduce the capacitance between the electrode and substrate 11 in the device of the ‘455 reference. As such, the Office Action’s assertion that the combination would reduce the capacitance between gate 19 and substrate 11 are speculative at best. Unlike *KSR*, where the combination involved combining “two known devices according to their established functions”, the Office Action’s proposed combination does not involve simply combining teachings in which the cited references are not modified in their operation. *See KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007). Thus, the Office Action’s assertion of some vague “articulated reasoning” in support of the modification (*e.g.*, “high speed operation”) is insufficient. *KSR* and M.P.E.P. § 2141 make it clear that such assertions are inapplicable where the operation of one of the references is modified. For example, according to M.P.E.P. § 2141, Applicant can rebut such assertions of obviousness simply by showing that “the elements in combination do not merely perform the function that each element performs separately.” This is also consistent with various parts of *KSR*, which repeatedly refer to combined teachings in which the cited references are not modified in their operation. Thus, in the context of *KSR*, the asserted combination “as a whole” is entirely unpredictable based on the asserted teachings of the ‘455 and ‘855 references. Accordingly, the § 103(a) rejection of claim 3 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the § 103(a) rejection of claim 7 because the cited portions of the ‘455 reference do not correspond to aspects of the claimed invention directed to an additional trench filled with conductive material that extends through the source region to the body region. The Office Action improperly asserts that source electrode 21 extends in a trench through source layer 14 to well layer 13. As is clearly shown in Figure 4, source layer 14 and well layer 13 each extend to the surface of the device where they connect to source electrode 21. As such, the source electrode 21 does not extend through source layer 14 to well layer 13 to connect the source electrode to the well layer, as does the additional trench filled with conductive material of the claimed invention. *See, e.g.*, Applicant’s Figure 3. Applicant notes that (while not expressly cited) the Office Action appears to be relying upon terminal trench 15a, however, trench 15a does not extend through source layer 14 or well layer 13 but instead extends through drift layer 12 as is shown in Figure 4. Accordingly, the § 103(a) rejection of claim 7 is improper and Applicant requests that it be withdrawn.

Applicant respectfully traverses the § 112(2) rejection of claims 15-18 because the scope of the term “steeply” would be clear to the skilled artisan when read in light of Applicant’s specification (*see, e.g.*, M.P.E.P. § 2173.05(b)), in contrast to the Office Action’s erroneous assertions. For example, paragraphs 0019-0021 of the published versions of Applicant’s specification discuss the drift region having a steeply graded doping concentration that increases from the body region to the drain region, including giving specific examples of the increases in concentration that include the doping concentration being 50, 100 or 200 times greater adjacent the drain region (as recited in claims 16 and 17). Notwithstanding, to facilitate prosecution, Applicant has amended claim 15 to remove the term steeply and to recite that the doping concentration in the part of the drift region adjacent to the drain region is at least an order of magnitude greater than the doping concentration in the part of the drift region adjacent to the body region. Accordingly, the § 112(2) rejection of claims 15-18 is improper and Applicant requests that it be withdrawn.

In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Peter Zawilski, of NXP Corporation at (408) 474-9063 (or the undersigned).

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